

1.2

Focus on Communicating

Number	1	2	3	4	5	6	7	8	9
Greek	α	β	γ	δ	ϵ	ς	ζ	η	θ
Roman	I	II	III	IV	V	VI	VII	VIII	IX
Chinese (ancient)	—	=	≡	≡≡	⌂	∧	+	11	⌂
Chinese (modern)	一	二	三	四	五	六	七	八	九

Did You Know?

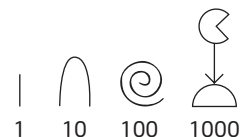
The numerals, 1, 2, 3, ..., 9, that we use are known as the Hindu-Arabic system. They were probably developed in India. They have been found on a Hindu plate dated 595. The symbols came to the Western world via Arabia.

People have been communicating for thousands of years—that includes communicating mathematically. We currently represent numbers using the numerals 0, 1, 2, and so on. Ancient civilizations used different symbols to represent numbers.

Investigate

How can you represent numbers with ancient symbols?

About 5000 years ago, the ancient Egyptians used symbols to represent numbers.



- How would the Egyptians represent the numbers 13, 126, and 1291?
- The Egyptians also used fractions, placing the numeral symbols under the symbol

They represented $\frac{1}{2}$ as

- How would the Egyptians represent $\frac{1}{10}$?
- Describe two ways in which the Egyptians might have represented the fraction $\frac{2}{3}$.
- Describe any similarities between the Egyptian number system and the ancient Chinese number system in the table above.
- Reflect** Is our number system more like the Egyptian or the Chinese system? In what way?

Example Use a Diagram to Communicate

How does the diagram illustrate a relationship between the areas of squares on the sides of a right triangle?

Solution

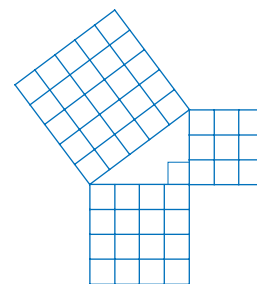
The triangle is right angled, with a square placed on each side.

The sum of the areas of the two smaller squares is

$$\begin{aligned}3^2 + 4^2 &= 9 + 16 \\ &= 25\end{aligned}$$

The area of the square on the hypotenuse is 25, or 5^2 .

This shows that the area of the square on the hypotenuse equals the sum of the areas of the squares on the other two sides. This is the Pythagorean relationship.



Key Concepts

- It is important to be able to communicate clearly in mathematics. Communication can take the form of words, diagrams, and symbols.
- Use mathematical vocabulary when explaining your strategies.
- Use correct mathematical form when using symbols and simplifying expressions.
- Draw neat, fully labelled diagrams to illustrate a situation.



Communicate Your Understanding

C1 The ancient Maya from Central America used symbols to represent numbers as shown.

- Describe the meaning of each symbol.
- Represent the numbers 10 and 27 using Mayan symbols.

•••• 4 ••• 8 •• 17
 =

C2 Describe how to determine the pattern in the sequence 13, 15, 18, 22, What are the next two terms?

C3 To calculate 8% of 120, Greg wrote

$$8\% \times 120 = .08 \times 120 = 9.6$$

- There are two things that Greg should do to rewrite his work in better mathematical form. What are they?
- Give two reasons why it is a good idea to use correct mathematical form.

Practise

1. Describe the pattern in each sequence. Give the next two terms.

a) 15, 10, 5

b) $-6, -10, -14$

c) $\frac{1}{4}, \frac{1}{2}, \frac{3}{4}$

d) $\frac{12}{5}, 2, \frac{8}{5}$

e) 3, -6 , 12, -24

f) $-96, -48, -24$

g) 100, 80, 65, 55

h) 3, 3, 6, 18, 72



2. a) Build a sequence of numbers.

b) Describe the process you used to build the sequence.

c) Trade your sequence with a classmate. Find the pattern.

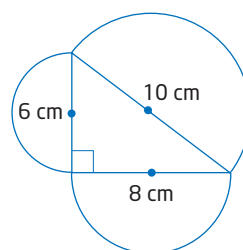
Connect and Apply

Making Connections

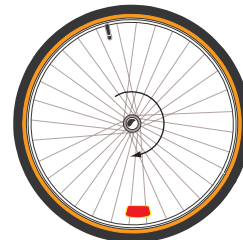
You worked with the formula for the area of a circle in grade 8.

$$A = \pi r^2.$$

3. Refer to the Example. Is there a relationship between the areas of semicircles placed on each side of a right triangle? Use the diagram to help you explain your answer.



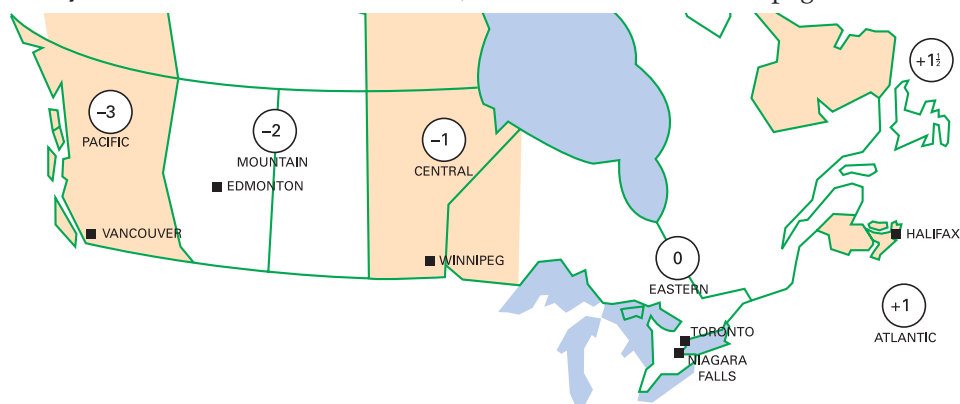
4. A light is attached to the circumference of a wheel. As the wheel rolls along the road, which of the following diagrams represents the path of the light? Explain your reasoning.



5. a) Explain how the time zone map uses integers to determine the time in another time zone.

b) If it is 3:00 P.M. in Toronto, what time is it in Halifax?

c) If it is 2:30 A.M. in Vancouver, what time is it in Winnipeg?



6. The diagram illustrates the meaning of fractions.

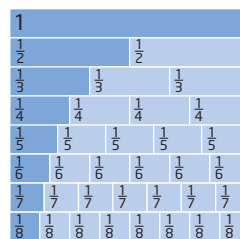
a) Explain how to use the diagram to illustrate which is greater,

$$\frac{3}{7} \text{ or } \frac{4}{8}.$$

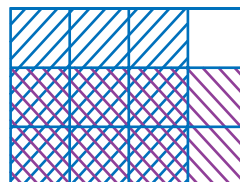
b) How could you use the diagram to illustrate how to add $\frac{1}{2} + \frac{1}{3}$? Explain.

c) How many rows would you need to illustrate $\frac{1}{3} + \frac{1}{4}$? Explain.

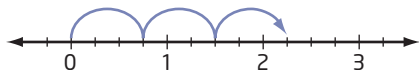
d) Describe a pattern or trend in the dark blue bars.



7. a) Explain how the diagram illustrates the fact that $\frac{2}{3} \times \frac{3}{4} = \frac{1}{2}$.



b) What product is modelled by the number line diagram?



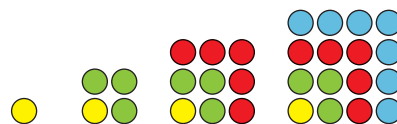
8. The diagrams illustrate a rule for adding odd numbers.

a) Describe the rule.

b) Verify your rule for the fifth and sixth diagrams.

c) Use your rule to find the sum of the odd numbers from 1 to 99.

d) Use your rule to find the sum of the odd numbers from 150 to 600.



Extend

9. Each three by three square, each row, and each column must contain each of the numerals 1 through 9 only once. Copy and complete this Sudoku puzzle. Describe the problem solving process that you used.

		9		7	8			2
	7	5				3		1
8		3			1		7	
	6			2		8		4
	3	8	1		4		6	7
9		2			7		3	5
		1		3	2	5		6
	5	4			6	9		8
	8			4	5		1	

10. In a factory, there are 10 assembly points equally spaced along a 9-m section of an assembly line. A supply bin is to be located 5 m away from the assembly line. Where is the best location for the supply bin so that the workers will have to go the least distance to get their supplies? Justify your solution.